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HOW DO BANKS SET INTEREST RATES?

by Leonardo Gambacorta*

Abstract

The aim of this paper is to study cross-sectional differences in banks interest rates. It adds to the existing literature in two ways. First, it analyzes systematically the micro and macroeconomic factors that influence the price-setting behaviour of banks. Second, by using banks' prices (rather than quantities) it provides an alternative way of disentangling loan supply from loan demand shift in the "bank lending channel" literature. The results, derived from a sample of Italian banks, suggest that heterogeneity in the banking rates pass-through exists only in the short run. Consistently with the literature, interest rates on short-term lending of liquid and well-capitalized banks react less to changes in money market rates. Also banks with a high proportion of long-term lending tend to modify their prices less. Heterogeneity in the pass-through on the interest rate on current accounts depends mainly on banks' liability structure. Bank size is never relevant.

JEL classification: E44, E51, E52.

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Contents

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1. Introduction[1]

This paper studies cross-sectional differences in the price-setting behaviour of Italian banks in the last decade. The study was motivated by two major considerations. First, heterogeneity in the response of bank interest rates to market rates helps to explain how monetary policy decisions are transmitted through the economy independently of the consequences for bank lending. The analysis of heterogeneous behaviour in banks' interest setting has been largely neglected by the existing literature. The majority of studies of the "bank lending channel" analyze the response of credit aggregates to a monetary policy impulse, but pay no attention to the effects on prices. This seems odd because, in practice, when bank interest rates change, real effects on consumption and investment could be produced even if there were no changes in total lending. The scant evidence on the effects of monetary shocks on bank prices is mainly due to the lack of long series of micro data on interest rates and contrasts with some recent works highlighting a different adjustment of retail rates in the euro area (see, amongst others, de Bondt et al., 2003).

Second, this paper aims to add to the "bank lending channel" literature by identifying loan supply shocks via banks' prices (rather than quantities). To date the "identification problem" has been solved by claiming that certain bank-specific characteristics (i.e. size, liquidity, capitalization) influence only loan supply movements, while banks' loan demand is independent of them. After a monetary tightening, the drop in the supply of credit should be larger for small banks, which are financed almost exclusively from deposits and equity (Kashyap and Stein, 1995), less liquid banks, which cannot protect their loan portfolio against monetary tightening simply by drawing down cash and securities (Stein, 1998; Kashyap and Stein, 2000), and poorly capitalized banks, which have less access to markets for uninsured funding (Peek and Rosengren, 1995; Kishan and Opiela, 2000; Van den Heuvel, 2001a; 2001b).[2] The intuition of an identification via prices of a loan supply shift is very simple: if loan demand is not perfectly elastic, the effect of a monetary tightening on

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[1] This study was developed while the author was a visiting scholar at the NBER. I wish to thank two anonymous referees for very helpful comments. The opinions expressed in this paper are those of the author only and in no way involve the responsibility of the Bank of Italy and the NBER. Email: leonardo.gambacorta@bancaditalia.it.

[2] All these studies on cross-sectional differences in the effectiveness of the "bank lending channel" refer to the US. The literature on European countries is far from conclusive (see Altunbas et al., 2002; Ehrmann et al., 2003). For Italy see Gambacorta (2004) and Gambacorta and Mistrulli (2004).

bank interest rates should be more pronounced for small, low-liquid and low-capitalized banks.

Apart from these standard indicators other bank-specific characteristics could influence banks' price-setting behaviour (Weth, 2002). Berlin and Mester (1999) claim that banks which depend heavily on non-insured funding (i.e. bonds) will adjust their deposit rates more (and more quickly) than banks whose liabilities are less affected by market movements. Berger and Udell (1992) maintain that banks with close ties with their customers will change their lending rates comparatively less and slowly.

In this paper heterogeneity in banks' behaviour is sought by using a balanced panel of 73 Italian banks that represent more than 70 per cent of the banking system. Heterogeneity is investigated with respect to the interest rate on short-term lending and that on current accounts. The use of microeconomic data is particularly appropriate in this context because aggregation may significantly bias the estimation of dynamic economic relations (Harvey, 1981). Moreover, information at the level of individual banks provides a more precise understanding of their behavioural patterns and should be less prone to structural changes, such as the creation of EMU.

The paper reaches two main conclusions. First, heterogeneity in banking rates pass-through exists, but it is detected only in the short run: no differences exist in the long-run elasticities of banking rates to money market rates. Second, consistently with the literature, interest rates on short-term lending by liquid and well-capitalized banks react less strongly to changes in money market rates. Moreover, banks with a high proportion of long-term lending tend to modify their prices less. Heterogeneity in the pass-through on the interest rate on current accounts depends mainly the liability structure of the banks. Bank size is never relevant.

The paper is organized as follows. Section 2 describes some institutional characteristics that help to explain the behaviour of banking rates in Italy in the last two decades. Section 3 reviews the main channels that influence banks' interest rate settings by trying to disentangle macro from microeconomic factors. After a description of the econometric model and the data in Section 4, Section 5 shows the empirical results. Robustness checks are presented in Section 6. The last section summarizes the main conclusions.

2. Some facts regarding bank interest rates in Italy

Before discussing the main channels that influence banks' price setting, it is important to analyze the institutional characteristics that have influenced bank interest rates in Italy in the last two decades. The purpose of this section is therefore to highlight some facts that could help to explain the differences, if any, with respect to the results obtained by the existing literature for the 1980s and mid-1990s.

For example, there is evidence that in the eighties Italian banks were comparatively slow to adjust their rates (Verga, 1984; Banca d'Italia, 1986, 1988; Cottarelli and Kourelis, 1994), but important measures to liberalize the markets and introduce deregulation in the last twenty years should have influenced the speed at which changes in money market conditions are transmitted to lending and deposit rates (Cottarelli et al. 1995; Passacantando, 1996; Ciocca, 2000; Angelini and Cetorelli, 2002).

In fact, between the mid-1980s and the early 1990s all the restrictions that characterized the Italian banking system were gradually removed. In particular: 1) the ceiling on lending was definitively abolished in 1985; 2) foreign exchange controls were lifted between 1987 and 1990; 3) branching was liberalized in 1990; 4) the 1993 Consolidated Law on Banking allowed banks and special credit institutions to perform all banking activities.

In particular, the 1993 Consolidated Law on Banking completed the institutional, operational and maturity despecialization of the Italian banking system, ensuring consistent supervisory controls and a uniform range of operations of intermediaries within a single market framework. The restriction imposed by the 1936 Banking Law, which distinguished between banks that could raise short-term funds (aziende di credito) and those that could not (Istituti di credito speciale), was eliminated.[3] To avoid criticism of structural breaks, the econometric analysis is based on the period 1993:03-2001:03, when all the main reforms of the Italian banking system had already taken place.

[3] For more details see Banca d'Italia, Annual Report for 1993.

The behaviour of bank interest rates in Italy reveals some stylized facts (Figures 1 and 2). First, there has been a substantial fall in average rates since the end of 1992, and second there has been a strong and persistent dispersion of rates among banks. These stylized facts suggest that both the time series and the cross sections dimensions are important for understanding the banks' interest setting. This justifies the use of panel data techniques.

The main reason for the fall in bank interest rates was probably the successful monetary policy enacted to reduce inflation in the country in order to fulfill the Maastricht criteria and reach the third stage of EMU. As a result, the interbank rate decreased by more than 10 percentage points in the period 1993-99. Excluding the episode of turbulence on the foreign exchange markets in 1995, it moved upwards from the third quarter of 1999 to the end of 2000, then continued its declining trend. From a statistical point of view, this behaviour calls for the investigation of a possible structural break in the nineties.[4]

The second stylized fact is cross-sectional dispersion among interest rates. Figure 2 shows the coefficient of variation for loan and deposit rates both over time and across banks in the period 1987-2001.[5] The temporal variation (dotted line) of the two rates shows a different behaviour from the mid-1990s when the deposit rate is more variable, probably for a catching-up process of the rate toward a new equilibrium caused by the convergence process. Moreover, the cross-sectional dispersion of the deposit rate is greater than that of the loan rate, especially after the introduction of the euro.[6]

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[4] In the period 1995-98, which coincides with the convergence process towards stage three of EMU, it will be necessary to allow for a change in the statistical properties of interest rates (see the Appendix).

[5] The coefficient of variation is given by the ratio of the standard errors to the mean. The series that refers to the variability "over time" shows the coefficient of variation in each year of monthly figures. By contrast, the series that capture the variability "across banks" shows the coefficient of variation of annual averages of bank-specific interest rates.

[6] In the period before the 1993 Consolidated Law on Banking deposit interest rates were quite sticky to monetary policy changes. Deposit interest rate rigidity in this period has been extensively analyzed for the US as well. Among the market factors that have been found to affect the responsiveness of bank deposit rates are the direction of the change in market rates (Ausubel, 1992; Hannan and Berger, 1991), whether the bank interest rate is above or below a target rate (Hutchison, 1995; Moore, Porter and Small, 1990; Neumark and Sharpe, 1992), and market concentration in the bank's deposit market (Hannan and Berger, 1991). Rosen (2001) develops a model of price settings in the presence of heterogeneous customers to explain why bank deposit interest rates respond sluggishly to some extended movements in money market rates but not to others. Hutchinson (1995) presents a model of bank deposit rates that includes a demand function for customers and predicts a linear (but less than one-for-one) relationship between market interest rate changes and bank interest rate changes. Green (1998) claims that the rigidity is due to the fact that bank interest rate management is based on a two-tier pricing system; banks offer accounts at market related interest rates and at posted rates that are changed at discrete intervals.

3. What does influence banks' interest rate setting?

The literature that studies banks' interest rate setting behaviour generally assumes that banks operate under oligopolistic market conditions.[7] This means that a bank does not act as a price-taker but sets its loan rates taking into account the demand for loans and deposits. This section reviews the main channels that influence banks' interest rates (Figure 3).

Loan and deposit demand

The interest rate on loans depends positively on real GDP and inflation (y and p). Better economic conditions increase the number of projects becoming profitable in terms of expected net present value and hence increase the demand for credit (Kashyap, Stein and Wilcox, 1993). As stressed by Melitz and Pardue (1973) only boosts in permanent income (y^P) have a positive influence on loan demand, while the effect due to the transitory part (y^T) could also be associated with a self-financing effect that reduces the proportion of bank debt (Friedman and Kuttner, 1993).[8] An increase in the money market rate (i_M) raises the opportunity cost of other forms of financing (i.e. bonds), making lending more attractive. This mechanism also boosts loan demand and increases the interest rate on loans.

The interest rate on deposits is negatively influenced by real GDP and inflation. A higher level of income increases the demand for deposits[9] and therefore reduces the incentive for banks to set higher deposit rates. In this case the shift of deposit demand will be higher if the transitory component of GDP is affected (unexpected income is generally first deposited in current accounts). On the contrary, an increase in the money market rate, *ceteris paribus*, makes it more attractive to invest in risk-free securities that represent an alternative to detaining deposits; the subsequent reduction in deposit demand determines an upward pressure on the interest rate on deposits.

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[7] For a survey on modeling the banking firm, see Santomero (1984). Among more recent works, see Green (1998) and Lim (2000).

[8] Taking this into account, in Section 4 I tried to disentangle the two effects using a Beveridge and Nelson (1981) decomposition. More details are provided in the Appendix.

[9] The aim of this paper is not to answer the question whether deposits are input or output for the bank (see Freixas and Rochet, 1997, on this debate). For simplicity, here deposits are considered a service supplied by the bank to depositors and are therefore regarded as an output (Hancock, 1991).

Operating cost, credit risk and interest rate volatility

The costs of intermediation (screening, monitoring, branching costs, etc.) have a positive effect on the interest rate on loans and a negative effect on that on deposits (efficiency is represented by *e*). The interest rate on lending also depends on the riskiness of the credit portfolio; banks that invest in riskier projects will have a higher rate of return in order to compensate the higher percentage of bad loans that have to be written off (*j*).

Bank interest rates are also influenced by interest rate volatility. High volatility of the money market rate (σ) should increase lending and deposit rates. Following the dealership model by Ho and Saunders (1981) and its extension by Angbazo (1997), the interest rate on loans should be more affected by interbank interest rate than that on deposits ($di_L/d\sigma > di_D/d\sigma$). This should indicate a positive correlation between interest rate volatility and the spread.

Interest rate channel

Bank interest rates are also directly influenced by monetary policy changes. A monetary tightening (easing) determines a reduction (increase) in reservable deposits and an increase (reduction) in market interest rates. This has a positive effect on bank interest rates through the traditional "interest rate channel". Nevertheless, the increase in the cost of financing could have a different impact on banks depending on their specific characteristics. There are two channels through which heterogeneity among banks may produce a different impact on lending and deposit rates: the "bank lending channel" and the "bank capital channel". Both mechanisms are based on adverse selection problems that affect banks fund-raising, but from different perspectives.

Bank lending channel

According to the "bank lending channel" thesis, a monetary tightening has an effect on bank loans because the drop in reservable deposits cannot be completely offset by issuing other forms of funding (i.e. uninsured CDs or bonds; for an opposite view see Romer and Romer, 1990) or liquidating some assets. Kashyap and Stein (1995, 2000), Stein (1998) and Kishan and Opiela (2000) claim that the market for bank debt is imperfect. Since non-reservable liabilities are not insured and there is an asymmetric information problem about

the value of banks' assets, a "lemon's premium" is paid to investors. According to these authors, small, low-liquid and low-capitalized banks pay a higher premium because the market perceives them to be more risky. Since these banks are more exposed to asymmetric information problems they have less capacity to shield their credit relationships in the case of a monetary tightening, and they should cut their supplied loans and raise their interest rates by a larger amount. Moreover, these banks have less capacity to issue bonds and CDs and therefore they could try to contain the drain of deposits by raising their rates more. In Figure 3 three effects are highlighted: the "average" effect due to the increase in the money market rate (which is difficult to disentangle from the "interest rate channel"), the "direct" heterogeneous effect due to bank-specific characteristics (X_{t-1}) and the "interaction effect" between monetary policy and the bank-specific characteristic ($i_M X_{t-1}$). These last two effects can be genuinely attributed to the "bank lending channel" because bank-specific characteristics influence only loan supply movements. Two aspects should be stressed. First, to avoid endogeneity problems bank-specific characteristics should refer to the period before banks set their interest rates. Second, heterogeneous effects, if any, should be detected only in the short run, while there is no *a priori* reason why these effects should influence the long-run relationship between interest rates.

Apart from the standard indicators of size (logarithm of total assets), liquidity (cash and securities over total assets) and capitalization (excess capital over total assets),[10] two other bank-specific characteristics are worth investigating: a) the ratio between deposits and bonds plus deposits; b) the ratio between long-term loans and total loans.

The first indicator is in line with Berlin and Mester (1999): banks that depend heavily on non-deposit funding (i.e. bonds) will adjust their deposit rates by more (and more quickly) than banks whose liabilities are less affected by market movements. The intuition of this result is that, other things being equal, it is more likely that a bank will adjust its terms

[10] It is important to note that the effect of bank capital on the "bank lending channel" cannot be easily captured by the capital-to-asset ratio. This measure, generally used by the existing literature to analyze the distributional effects of bank capitalization on lending, does not take into account the riskiness of a bank portfolio. A relevant measure is instead the excess capital that is the amount of capital banks hold in excess of the minimum required to meet prudential regulation standards. Since minimum capital requirements are determined by the quality of bank's balance-sheet activities, the excess capital represents a risk-adjusted measure of bank capitalization that gives more indications regarding the probability of a bank default. Moreover, the excess capital is a relevant measure of the availability of the bank to expand credit because it directly controls for prudential regulation constraints. For more details see Gambacorta and Mistrulli (2004).

for passive deposits if the conditions of its own alternative form of refinancing change. Therefore an important indicator in analyzing the pass-through between market and banking rates is the ratio between deposits and bonds plus deposits. Banks which use relatively more bonds than deposits for financing purposes fall under greater pressure because their costs increase contemporaneously and to similar extent to market rates.

The Berger and Udell (1992) indicator represents a proxy for long-term business; those credit institutions that maintain close ties with their non-bank customers will adjust their lending rates comparatively less and slowly. Banks may offer implicit interest rate insurance to risk-averse borrowers in the form of below-market rates during periods of high market rates, for which the banks are later compensated when market rates are low. Having this in mind, banks that have a higher proportion of long-term loans should be more inclined to split the risk of monetary policy change with their customers and preserve credit relationships. For example, Weth (2002) finds that in Germany those banks with large volumes of long-term business with households and firms change their prices less frequently than the others.

Bank capital channel

The "bank capital channel" is based on three hypotheses. First, there is an imperfect market for bank equity: banks cannot easily issue new equity owing to the presence of agency costs and tax disadvantages (Myers and Majluf, 1984; Cornett and Tehranian, 1994; Calomiris and Hubbard, 1995; Stein, 1998). Second, banks are subject to interest rate risk because their assets typically have a longer maturity than liabilities (maturity transformation). Third, regulatory capital requirements limit the supply of credit (Thakor, 1996; Bolton and Freixas, 2001; Van den Heuvel, 2001a; 2001b).

The mechanism is the following. After an increase in market interest rates, a smaller fraction of loans can be renegotiated with respect to deposits (loans are mainly long-term, while deposits are typically short-term): banks therefore incur a cost due to the maturity mismatch that reduces profits and then capital accumulation.[11] If equity is sufficiently low and it is too costly to issue new shares, banks reduce lending (otherwise they fail to meet

[11] In Figure 3, the cost per unit of asset due to maturity transformation at time *t*-1 (ρ_{it-1}) is multiplied by the actual change in the money market rate (Δi_{Mt}). For more details see the Appendix.

regulatory capital requirements) and widen their interest rate spread. This leads to an increase in the interest rates on loans and a decrease in those on deposits:[12] in the oligopolistic version of the Monti-Klein model, the maturity transformation cost has the same effect as an increase in operating costs.

Industry structure

The literature underlines two possible impacts of concentration on the pricing behaviour of banks (Berger and Hannan, 1989). A first class of model claims that more concentrated banking industry will behave oligopolistically (structure-performance hypothesis), while another class of model stresses that concentration is due to more efficient banks taking over less efficient counterparts (efficient-structure hypothesis). This means that in the first case lower competition should result in higher spreads, while in the second case a decrease in managerial costs due to increased efficiency should have a negative impact on the spread. In the empirical part great care will be paid therefore to the treatment of bank mergers (see the Appendix). Nevertheless, the scope of this paper is not to extract policy implications for this issue, for which a different analysis is needed. The introduction of bank-specific dummy variables (μ_i) tries to control for this and other missing aspects.[13]

4. Empirical specification and data

The empirical specification used in this paper adapts the standard approach for the estimation of bank rates to the case of heterogeneous banks. Following Cottarelli et al. (1995), Lim (2000) and Weth (2002) we start from two simple error correction models that establish a long-run relationship between each bank rate and the money market rate. Economic theory on oligopolistic (and perfect) competition suggests that, in the long run, both bank rates (on lending and deposits) should be related to the level of the monetary rate

[12] The "bank capital channel" can also be at work even if the capital requirement is not currently binding. Van den Heuvel (2001a) shows that low-capitalized banks may optimally forgo lending opportunities now in order to lower the risk of capital inadequacy in the future. This is interesting because in reality most banks are not constrained at any given time.

[13] In Section 6 this hypothesis will be tested introducing a specific measure of the degree of competition that each banks faces. For a more detailed explanation of the effect of concentration on the pricing behaviour of Italian banks see Focarelli and Panetta (2003).

that reflects the marginal yield of a risk-free investment (Klein, 1971).[14]

$$(1)\quad \Delta i_{L\,k,t} = \mu_k + \sum_{j=1}^{2} \kappa_j \Delta i_{L\,k,t-j} + \sum_{j=0}^{2} \beta_j \Delta i_{M\,t-j} + \alpha\, i_{L\,k,t-1} + \gamma\, i_{M\,t-1} + \sum_{j=0}^{2} \phi_j \overline{Z}_{\,t-j} + \Gamma \overline{\Phi}_{k,t} + \varepsilon_{k,t}$$

$$(2)\quad \Delta i_{D\,k,t} = \mu_k + \sum_{j=1}^{2} \kappa_j \Delta i_{D\,k,t-j} + \sum_{j=0}^{2} \beta_j \Delta i_{M\,t-j} + \alpha\, i_{D\,k,t-1} + \gamma\, i_{M\,t-1} + \sum_{j=0}^{2} \phi_j \overline{Z}_{\,t-j} + \Gamma \overline{\Phi}_{k,t} + \varepsilon_{k,t}$$

with k=1,…, N (k=banks) and t=1, …,T (t= periods). Data are quarterly (1993:03-2001:03) and not seasonally adjusted. The panel is balanced with N=73 banks. Two lags have been selected in order to obtain white noise residuals. The description of the variables is reported in Table 1. The vector $\overline{Z}$ =($\Delta \ln y^P$, $\Delta \ln y^T$, p, Δc_k, j_k, e_k, σ) includes stationary variables that influence interest rates in the short run; $\overline{\Phi}$ is a vector of dummies. The model allows for fixed effects across banks, as indicated by the bank-specific intercept μ_k. The long-run elasticity between each bank rate and the money market rate is given by γ/α, while the loading coefficient is represented by α.

Asymmetric effects across banks due to a bank-specific characteristic X are analyzed following the approach used by Kashyap and Stein (2000) and by Ehrmann et al. (2003). In particular, equations (1) and (2) are modified by introducing interaction terms between interest rates and the bank-specific characteristic that capture heterogeneity in the monetary transmission mechanism. The bank-specific characteristic is also introduced alone to control for distributional effects in interest rate changes independent of monetary policy. We have:

$$(3)\quad \begin{aligned} \Delta i_{L\,k,t} = {} & \mu_k + \sum_{j=1}^{2} \kappa_j \Delta i_{L\,k,t-j} + \sum_{j=0}^{2} (\beta_j + \beta_j^{*} X_{\,k,t-1}) \Delta i_{M\,t-j} + \lambda X_{\,k,t-1} + \\ & + (\alpha + \alpha^{*} X_{\,k,t-1}) i_{L\,k,t-1} + (\gamma + \gamma^{*} X_{\,k,t-1}) i_{M\,t-1} + \sum_{j=0}^{2} \phi_j \overline{Z}_{\,t-j} + \Gamma \overline{\Phi}_{k,t} + \varepsilon_{k,t} \end{aligned}$$

[14] Freixas and Rochet (1997) show that in a model of imperfect competition among N banks, if a part of deposits (η) is invested in compulsory reserves, the long-run relationships among lending, deposit and money market rates become: i_L=i_M+ *mark-up* and i_D=(1-η) i_M+ *mark-down*.

$$\Delta i_{D\,k,t} = \mu_k + \sum_{j=1}^{2} \kappa_j \Delta i_{D\,k,t-j} + \sum_{j=0}^{2} (\beta_j + \beta_j^* X_{k,t-1}) \Delta i_{M\,t-j} + \lambda X_{k,t-1} +$$

(4)

$$+ (\alpha + \alpha^* X_{k,t-1}) i_{D\,k,t-1} + (\gamma + \gamma^* X_{k,t-1}) i_{M\,t-1} + \sum_{j=0}^{2} \phi_j \overline{Z}_{t-j} + \Gamma \overline{\Phi}_{k,t} + \varepsilon_{k,t}$$

where the bank-specific characteristic X refers to t-1 to avoid an endogeneity bias.[15]

The long-run elasticity between each bank rate and the money market rate is given by: $(\gamma + \gamma^* X_{k,t-1}) / (\alpha + \alpha^* X_{k,t-1})$. Therefore to test if the pass-through between the money market rate and the bank rate is complete it is necessary to verify that this elasticity is equal to one. If this is the case there is a one-to-one long-run relationship between the lending (deposit) rate and the money market rate, while the individual effect μ_k influences the bank-specific mark-up (mark-down). The loading coefficient $(\alpha + \alpha^* X_{k,t-1})$ must be significantly negative if the assumption of an equilibrium relationship is correct. In fact, it represents what percentage of an exogenous variation from the steady state between the rates is brought back towards equilibrium in the next period.[16]

The degree of bank interest rate stickiness in the short run can be analyzed by the impact multiplier and the total effect after three months.

The variable $X_{k,t-1}$ represents a bank-specific characteristic that economic theory suggests influences only loan and deposit supply movements, without affecting loan and deposit demand. In particular, all bank-specific indicators ($\chi_{k,t}$) have been re-parameterized in the following way:

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[15] Given the complexity of the model, we have followed a "general to specific" strategy in order to drop some statistically insignificant variables in the $\overline{Z}$ vector. Nevertheless, this approach has not be interpreted as a mechanical reduction process that implies dropping all insignificant parameters (Pagan, 1990): the restrictions have been tested comparing the initial model with the reduced one. In the final models, only contemporaneous exogenous variables are included with the exception, as expected, of the risk measure for loans j_k in the equation for interest rate deposits. Moreover, the coefficients β_2 and β_2^* were never significant. The estimated equations are reported on top of Tables 3-5.

[16] Testing for heterogeneity in the loading coefficient means verifying if α^* is significant or not. At the same time heterogeneity in the long-run elasticity can be proved if $\alpha^*\gamma - \alpha\gamma^*$ is statistically different from zero.

$$X_{k,t} = \chi_{k,t} - \left(\sum_{t=1}^{T} \frac{\sum_{k=1}^{N} \chi_{k,t}}{N} \right) / T$$

Each indicator is therefore normalized with respect to the average across all the banks in the respective sample in order to obtain a variable whose sum over all observations is zero.[17] This has two implications. First, the interaction terms between interest rates and $X_{k,t-1}$ in equations (3) and (4) are zero for the average bank (this because $\overline{X}_{k,t-1}=0$). Second, the coefficients β_j, α and γ are directly interpretable as average effects.

To test for the existence of a "bank capital channel" we have introduced in vector $\overline{Z}$ the variable $c_{k,t} = \rho_{k,t-1}\Delta i_{Mt}$ representing the bank-specific cost of monetary policy due to maturity transformation. In particular, $\rho_{k,t-1}$ measures the loss per unit of asset a bank suffers when the monetary policy interest rate is raised by one per cent. The cost at time t is influenced by the maturity transformation in t-1. This variable is computed according to supervisory regulations on interest rate risk exposure that depends on the maturity mismatch among assets and liabilities (see the Appendix for further details). To work out the real cost we have therefore multiplied $\rho_{k,t-1}$ by the change that has occurred in interest rates. Therefore $c_{k,t} = \rho_{k,t-1}\Delta i_{Mt}$ represents the cost (gain) that a bank suffers (obtains) in each quarter. As formalized in Gambacorta and Mistrulli (2004) this measure influences the level of bank interest rates. Since the model is expressed in error correction form we have included this variable in first differences.

4.1 Characteristics of the dataset

The dataset includes 73 banks that represent more than 70 per cent of the total Italian banking system in terms of loans over the whole sample period. Since information on interest rates is not available for mutual banks, the sample is biased towards large banks. Foreign banks and special credit institutions are also excluded.

[17] The size indicator has been normalized with respect to the mean on each single period. This procedure removes trends in size (for more details see Ehrmann et al., 2003).

This bias toward large banks has two consequences. First, the distributional effects of the size variable must be treated with extreme caution because a "small" bank inside this sample should not be considered to have the same characteristics as where the full population of Italian banks is used.[18] The size grouping in this study mainly controls for variations in scale, technology and scope efficiencies across banks but it is not able to shed light on differences between mutual and other banks. Second, results for the average bank will provide more "macroeconomic insights" than studies based on the whole population (where the average bank size is very small).

Table 2 gives some basic information on the dataset. Rows are organized dividing the sample with respect to the bank-specific characteristics that are potential causes of heterogeneous shifts in loan supply in the event of changes in monetary policy. In the columns, the table reports summary statistics for the two interest rates and for each indicator.

Several clear patterns emerge. Considering size, small banks charge higher interest rates on lending but show a lower time variation. This fits the standard idea of a close customer relationship between small firms and small banks that provides them with an incentive to smooth the effect of a monetary tightening (Angelini, Di Salvo and Ferri, 1998). Moreover, small banks are more liquid and capitalized than average, and this should help them to reduce the effect of cyclical variations on supplied credit. On the liability side, the percentage of deposits (overnight deposits, CDs and savings accounts) is greater among small banks, while their bond issues are more limited than those of large banks. Nevertheless, no significant differences emerge in the level and volatility of the interest rate on current accounts.

High-liquid banks are smaller than average and are more capitalized. These characteristics should reduce the speed of the "bank lending channel" transmission through interest rates. In particular, since deposits represent a large share of their funding they should have a smoother transmission on passive rates.

[18] In particular, banks that are considered "small" in this study are labeled "medium" in other studies of the Italian banking system that analyze quantities (see Gambacorta, 2004; Gambacorta and Mistrulli, 2004). This is clear if one considers that the average assets of a "small" bank in my data (1.6 billion euros) over the sample period are very similar to those of a "medium" bank in the whole system (1.7 billion euros).

Well-capitalized banks make relatively more short-term loans. In general they are not listed and issue less subordinated debt to meet capital requirements. This evidence is consistent with the view that, *ceteris paribus*, capitalization is higher for those banks that bear more adjustment costs from issuing new (regulatory) capital. Well-capitalized banks charge a higher interest rate on lending; this probably depends on their higher ratios of bad loans, which increase their credit risk. In other words, their higher capitalization is necessary to cope with a riskier portfolio. Moreover, the interest rate on deposits is lower for low-capitalized banks, indicating that agents do not perceive these deposits as riskier than those at other banks. This has two main explanations. First, the impact of bank failures has been very small in Italy, especially with respect to deposits.[19] Second, the presence of deposit insurance insulates the deposits of less-capitalized banks from the risk of default.

The Berlin-Mester and the Berger-Udell indicators seem to have a high ability to explain heterogeneity in banks' price setting behaviour. Differences in the standard deviations of the two groups are particularly sensitive, calling for lower interest rate variability of banks with a high percentage of deposits and long-term loans.

5. Results

The main channels that influence the interest rate on short-term lending and that on current accounts are summarized, respectively, in Tables 3 and 4. The first part of each table shows the influence of the permanent and transitory components of real GDP and inflation. These macro variables capture cyclical movements and serve to isolate shifts in loan and deposit demand from monetary policy changes. The second part of the tables presents the effects of bank efficiency, credit risk and interest rate volatility. The third part highlights the effects of monetary policy. These are divided into four components: i) the immediate pass-through; ii) the one-quarter pass-through; iii) the long-run elasticity between each bank rate and the monetary policy indicator; iv) the loading coefficient of the cointegrating

[19] During our sample period, the share of deposits of failed banks to total deposits approached 1 per cent only twice, namely in 1987 and 1996 (Boccuzzi, 1998).

relationship.[20] The last part of the tables shows the significance of the "bank capital channel". Each table is divided into five columns that highlight, one at a time, the heterogeneous behaviour of banks with different characteristics in response to a monetary shock. The existence of distributional effects is tested for all four components of the monetary policy pass-through. The models have been estimated using the GMM estimator suggested by Arellano and Bond (1991), which ensures efficiency and consistency provided the models are not subject to serial correlation of order two and the instruments used are valid (which is tested for with the Sargan test).[21]

Loan and deposit demand

As predicted by theory, only changes in permanent income have a positive and significant effect on the interest rate on short-term lending, while the transitory component is never significant. In fact, as discussed in Section 3, the effect of transitory changes may also be due to a self-financing effect that reduces the proportion of bank debt. On the contrary, the interest rate on deposits is negatively influenced by real GDP. In this case the effect is higher when a change in the transitory component occurs because it is directly channeled through current accounts. The effect of inflation is positive on both interest rates but is significantly higher for short-term lending.

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[20] The immediate pass-through is given by the expression $\beta_0 + \beta_0^* X_{k,t-1}$ and heterogeneity among banks is simply tested through the significance of β_0^*. The effect for a bank with a low value of the characteristic under evaluation is worked out through the expression $\beta_0 + \beta_0^* \overline{X}_{k,t-1}^{0.25}$, where $\overline{X}_{k,t-1}^{0.25}$ is the average for the banks below the first quartile. Vice versa the effect for a bank with a high value of the characteristic is calculated using $\overline{X}_{k,t-1}^{0.75}$. The total effect after three months for the average bank is given by $\beta_0(1+\alpha_1+\kappa_1)+\beta_1+\gamma'$, while heterogeneity among banks can be accepted if and only if the expression $\left[\beta_0\alpha^* + \beta_0^*(1+\alpha+\kappa_1)+\beta_1^*+\gamma^*\right]X_{k,t-1} + \alpha^*\beta_0^* X_{k,t-1}^2$ is equal to zero. The long-run elasticity is given by: $(\gamma+\gamma^* X_k)/(\alpha+\alpha^* X_k)$, while the loading coefficient is $\alpha_1 + \alpha_1^* X_{k,t-1}$. Standard errors have been approximated with the "delta method" (Rao, 1973).

[21] In the GMM estimation, instruments are the second lag of the dependent variable and of the bank-specific characteristics included in each equation. Inflation, GDP growth rate and the monetary policy indicator are considered exogenous variables.

Operating costs, credit risk and interest rate volatility

Bank efficiency reduces the interest rate on loans and increases that of deposits. Nevertheless, the effect is not always significant at conventional levels, especially in the equation for the interest rate on current accounts. These results call for further robustness checks using a cost-to-asset ratio (see Section 6).

The relative amount of bad loans has a positive and significant effect on the interest rate on loans. This is in line with the standard result that banks that invest in riskier projects ask for a higher rate of return to compensate the credit risk.

Both bank rates are positively correlated with money market rate volatility. The correlation is higher for the interest rate on loans than for that on deposits. This is consistent with the prediction of the dealership model by Ho and Saunders (1981) and its extension by Angbazo (1997), where an increase in interbank interest rate volatility is associated with a higher spread.

Bank capital channel

As expected the "bank capital channel" (based on the maturity mismatch between bank assets and liabilities; see Section 3) has a positive effect on the interest rate on short-term lending and a negative effect on the interest rate on current accounts. The absolute values of the coefficients are greater in the first case, calling for a stronger adjustment on credit contracts than on deposits. Since this channel can be interpreted similarly to a general increase in the costs for banks, it is worth comparing this result with that obtained for the efficiency indicator. In both cases the effect is strongest for the interest rate on short-term lending, and this is consistent with the view that the interest rate on deposits is more sluggish.

Interest rate channel

A monetary tightening positively influences bank interest rates. After a one per cent increase in the monetary policy indicator, interest rates on short-term lending is immediately raised by around 0.5 per cent, and by around 0.9 per cent after a quarter. Moreover, the pass-through is complete in the long run (the null hypothesis of a unitary elasticity is accepted in all models). The reaction of the short-term lending rate is greater than in previous studies of

the Italian case and this calls for an increase in competition after the introduction of the 1993 Consolidated Law on Banking. Cottarelli et al. (1995), analyzing the period 1986:02-1993:04, find that the immediate pass-through is around 0.2 per cent, while the effect after three months is 0.6 per cent. Their long-run elasticity is equal to 0.9 per cent, but also in their model the null hypothesis of a complete pass-through in the long run is accepted.[22]

The long-run elasticity of the interest rate on current accounts is around 0.7 per cent. This result is in line with the recent findings by de Bondt et al. (2003) under a similar sample period and only a little higher than the long-run elasticity in Angeloni et al. (1995) for the period 1987:1-1993:04.[23]

The standard answer to the incomplete pass-through of money market changes on the deposit rate is the existence of banks' market power. Another explanation is the presence of compulsory reserves. To analyze this we can refer to the theoretical elasticity in the case of perfect competition. This benchmark case is very instructive because it allows us to analyze what happens if banks are price-takers (they take as given not only the monetary market rate but also the interest rates on loans and on deposits), set the quantity of loans and deposits and obtain a zero profit (the sum of the intermediation margins equals management costs). In this case the long-run elasticities become: $\frac{\partial i_L}{\partial i_M} = 1$ and $\frac{\partial i_D}{\partial i_M} = 1 - \eta$ where η is the fraction of deposits invested in risk-free assets (this includes the "compulsory" reserves). Therefore, in principle, an incomplete pass-through from market rates to deposits rates is also consistent with the fact that banks decide (or are constrained by regulation) to detain a certain fraction of their deposits in liquid assets.

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[22] There are three main differences between Cottarelli et al. (1995) and this paper. First, they use the Treasury bill rate as the reference monetary interest rate. However, from the early 1990s on this indicator became less important as "reference rate" because the interbank market became more competitive and efficient (Gaiotti, 1992). This is also stated by Cottarelli et al. (page 19). Second, they do not include macro variable controls in their equation. Third, their dataset is based on monthly data. To allow comparability between the results of this paper and those in Cottarelli et al. (1995) I have: 1) checked the results for different monetary policy indicators (i.e. the interbank rate; see Section 6); 2) excluded the macro variables from equation (1) to verify whether the results are sensitive to their inclusion. In all cases there was no change in the conclusion of an increased speed of reaction of short-term interest rates on loans to money market rates.

[23] The VAR model in Angeloni et al. considers the interest rate on total deposits (sight, time deposits and CDs), which is typically more reactive to monetary policy than that on current accounts because the service component in time deposits and CDs is less important. This means that in comparing our results with Angeloni et al. we are underestimating the potential effect of competition.

The loading coefficients are significantly negative at around –0.4 in the loan equation and –0.6 in the current account equation. This means that if an exogenous shock occurs, respectively 40 and 60 per cent of the deviation is cancelled out within the first quarter in each bank rate.

Bank lending channel

In the case of a monetary shock, banks with different characteristics behave differently only in the short run. On the contrary no heterogeneity emerges in the long-run relationship between each bank rate and the monetary policy indicator.

Considering each bank's specific characteristics one at a time (Tables 3 and 4), the interest rates of small, liquid and well-capitalized banks react less to changes in the money market rate. Also the Berlin-Mester and the Berger-Udell indicators have a strong ability to explain heterogeneity in banks' price-setting behaviour.

Nevertheless, the robustness of these distributional effects has to be checked in a model that takes all five indicators into account. In this model, in order to save degrees of freedom, the long-run elasticity between the money market rate and the short-term lending rate has been fixed at one; that between the money market rate and the interest rate on current account at 0.7.

Results are reported in Table 5 while Figure 4 highlights asymmetric effects. Interest rates on short-term lending by liquid and well-capitalized banks react less to a monetary policy shock. Also banks with a high proportion of long-term lending tend to change their prices less. Size is not significant.

This evidence matches previous results on lending. Liquid banks can protect their loan portfolio against a monetary tightening simply by drawing down cash and securities (Gambacorta, 2004). Well-capitalized banks that are perceived as less risky by the market are better able to raise uninsured funds in order to compensate the drop in deposits (Gambacorta and Mistrulli, 2004). Therefore the effects on lending detected for liquid and well-capitalized banks are mirrored by their higher capacity to insulate clients from the effects on interest rates as well. It is interesting to note that, in contrast with the evidence for the US (Kashyap and Stein; 1995), the interaction terms between size and monetary policy are insignificant. The fact that the interest rate on the short-term lending of smaller banks is

not more sensitive to monetary policy than that of larger banks is well documented in the literature for Italy and reflects the close customer relationship between small banks and small firms (Angeloni et al., 1995; Conigliani et al., 1997; Angelini, Di Salvo and Ferri, 1998; Ferri and Pittaluga, 1996). This result is also consistent with Ehrmann et al. (2003), where size does not emerge as a useful indicator for the distributional effect of monetary policy on lending, not only in Italy but also in France, Germany and Spain.

As regards the interest rate on current accounts, the Berlin-Mester indicator (hereafter BM) is the only bank-specific characteristic that explains heterogeneity in banks' price-setting behaviour. In particular, banks that depend heavily on non-deposit funding (banks with a low BM indicator) will adjust their interest rate on current accounts by more (and more quickly) than banks whose liabilities are less affected by market movements. As explained in Section 3, the intuition of this result is that, other things being equal, it is more likely that a bank will adjust its terms on deposits if the other conditions of refinancing change. The liability structure seems to influence not only the short-run adjustment but also the loading coefficient. This implies that banks with a high BM ratio react less when there is a deviation in the long-run mark-down: banks with a higher percentage of deposits have more room for adjusting their prices towards the optimal equilibrium. As expected, no cross-sectional differences emerge among banks due to size, liquidity and capitalization because current accounts are typically insured. This is consistent with the findings for current accounts in Gambacorta (2004).

6. Robustness checks

The robustness of the results has been checked in several ways. The first test was to introduce as additional control variable a bank-specific measure of the degree of competition that each bank faces in the market. In particular, the average value of the Herfindahl index in the different "local markets" (corresponding to the administrative provinces of Italy) in which the bank operates was introduced in each equation. The reason for this test is that the fixed effect (that also captures industry structure) remains stable over the whole period, while the degree of competition could change over time due to the effect of concentration. Therefore this test allows us also to check whether the bank mergers are treated properly. The Herfindahl index did not appear to be statistically significant and the results of the study did not change.

The second test was to use as bank efficiency indicator the cost-to-total-asset ratio instead of the ratio of total loans and deposits to the number of branches. In all cases the results remained unchanged.

The third test was to consider whether different fiscal treatments over the sample period could have changed deposit demand (from June 1996 the interest rate on current accounts is subject to 27 per cent tax, deducted at source; 12.5 per cent before). However, when the net interest rate on current accounts was used in place of gross rate, nothing changed.

The fourth robustness check was the introduction of a dummy variable to take account of the spike in the change of the repo interest rate caused by the turbulence in the foreign exchange market in the first quarter of 1995. The results are the same in this case too.

The fifth test was to introduce additional interaction terms combining the bank-specific characteristic with inflation, and permanent and transitory changes in real income. The reason for this test is the possible presence of endogeneity between bank characteristics and cyclical factors. Performing the test, however, nothing changed, and the double interactions were almost always not significant (they turned out to be statistically not different from zero in the case of the interaction of capitalization and permanent income).

The final robustness check was to introduce a dummy variable that indicates whether the bank belongs to a group (1) or not (0). Banks belonging to a group may be less influenced by monetary changes if they can benefit from internal liquidity management; in other words, bank holding companies establish internal capital markets in an attempt to allocate capital among their various subsidiaries (Houston and James, 1998; Upper and Worms, 2004). The introduction of this dummy did not change the results of the study.

7. Conclusions

This paper investigates the factors that influence the price-setting behaviour of Italian banks. It adds to the existing literature in two ways. First, it analyzes systematically a wide range of micro and macroeconomic variables that have an effect on bank interest rates: permanent and transitory changes in income, interest and credit risk, interest rate volatility, bank efficiency. Second, the analysis of bank prices (rather than quantities) provides an

alternative way of disentangling loan supply from loan demand shift in the "bank lending channel" literature.

The search for heterogeneity in banks' behaviour uses a balanced panel of 73 Italian banks that represent more than 70 per cent of the banking system. The use of microeconomic data helps to reduce the problems of aggregation that may significantly bias the estimation of dynamic economic relations and is less prone to structural changes such as the creation of EMU.

The main results of the study are the following. First, heterogeneity in the bank rate pass-through exists, but it is detected only in the short run: no differences exist in the long-run elasticities of bank rates to the money market rate. Second, consistently with the existing literature, interest rates on short-term lending of liquid and well-capitalized banks react less to changes in official rates. Also banks with a high proportion of long-term lending tend to modify their prices less. Heterogeneity in the pass-through on the interest rate on current accounts depends on banks' liability structure. Bank size is never relevant.

The policy implication of these results is that monitoring bank-specific characteristics is relevant for evaluating not only the total effects on lending and deposits but also the consequences on bank rates. This is particularly important in relation to the short-run distributional effects on consumption and investment, which are mainly driven by interest rates, while in the long run monetary policy determines a diverse response across banks only on the supply of loans and deposits.

Appendix– Technical details regarding the data

The dataset has been constructed using three sources. Interest rates are taken from the 10-day survey conducted by the Bank of Italy. Information on bank balance sheets comes from the Banking Supervision Register at the Bank of Italy. Data on macroeconomic variables are taken from International Financial Statistics.

Data on interest rates refer to transactions in euros (Italian lira before 1999). The deposit interest rate is the weighted average rate paid by the single banks on current accounts, which are highly homogenous deposit products.[24] The rate on domestic short-term lending for the single bank is the weighted average of all lending positions. Overdraft fees are excluded from this computation. The choice of the short-term rate as a measure of the bank interest lending pass-through is based on a number of considerations. First, short-term lending excludes subsidized credit. Second, short-term loans typically are not collateralized and this allows the "bank lending" channel to be insulated from the "balance sheet" channel. Broadly speaking, the pass-through from market interest rates to the interest rate on loans does not depend on market price variations that influence the value of collateral. Nearly half of banks' business is done at this rate.

Both interest rates are posted rates that are changed at discrete intervals (often less frequently than weekly; see Green, 1998). In our case, the quarterly frequency of the data is sufficient to capture all relevant changes due to a monetary policy shock. Both rates are gross of fiscal deductions.

The interest rate taken as monetary policy indicator is that on repurchase agreements between the Bank of Italy and credit institutions in the period 1993-98, and the interest rates on main refinancing operations of the ECB for the period 1999-2001.[25] The series does not

[24] Current accounts are the most common type of deposit (at the end of 2001 they represented around 70 per cent of total bank deposits and passive repos). Current accounts allow unlimited checking for depositor that can close the account without notice. The bank, in turn, can change the remuneration on the account at any point in time. Therefore differences in deposit rates are not influenced by heterogeneity in maturity (see Focarelli and Panetta, 2003).

[25] As pointed out by Buttiglione, Del Giovane and Gaiotti (1997), in the period under investigation the repo rate mostly affected the short-term end of the yield curve and, as it represented the cost of banks' refinancing, it represented the value to which market rates and bank rates eventually tended to converge. The interest rate on main refinancing operations of the ECB does not present any particular break with the repo rate.

present any break.

The cost (gain) a bank incurs (obtains) from her maturity transformation function is due to the different sensitivity of assets and liabilities to interest rates. Using a maturity ladder, we have:

$$\rho_i = \frac{\sum_j \left(\chi_j \cdot A_j - \zeta_j P_j \right)}{\sum_j A_j} * 100$$

where A_j (P_j) is the amount of assets (liabilities) of j months-to-maturity and χ_j (ζ_j) measures the increase in interest on assets (liabilities) of class j due to a 1 per cent increase in the monetary policy interest rate (Δi_M=0.01). In other words, if $\sum_j \left(\chi_j \cdot A_j - \zeta_j P_j \right) > 0$, ρ_i represents the cost per unit of asset bank k incurs if the monetary policy interest rate is raised by 1 percentage point. We obtain χ_j and ζ_j directly from supervisory regulation on interest rate risk exposure. In particular, the regulation assumes, for any given class j of months to maturity: 1) the same sensitivity parameter ($\chi_j = \zeta_j$) and 2) a non-parallel shift of the yield curve (Δi_M=0.01 for the first maturity class and then decreasing for longer maturity classes). Then, for each bank, after having classifying assets and liabilities according to their months-to-maturity class, we have computed the bank-specific variable ρ_i. This variable has then been multiplied by the change in the monetary policy indicator (Δi_M) to obtain the realized loss (or gain) per unit of asset in each quarter.

In assembling our sample, the so-called special credit institutions (long-term credit banks) have been excluded as they were subject to different supervisory regulations regarding the maturity range of their assets and liabilities. Nevertheless, special long-term credit sections of commercial banks have been considered part of the banks to which they belonged.

Particular attention has been paid to the treatment of mergers. In practice, it has been assumed that these took place at the beginning of the sample period, summing the balance-sheet items of the merging parties. For example, if bank A was incorporated by bank B at time t, bank B has been reconstructed backwards as the sum of the merging banks before the

merger. Bank interest rates have been reconstructed backwards using as weights the short-term loans and current accounts of the merging parties.[26]

Only banks reporting detailed lending and deposit rates over the whole sample period were considered. I refrain from adopting short time series to ensure sufficient asymptotic in the context of the error correction estimation. Bank observations that were missing or misreported or that constituted clear outliers were excluded from the sample.

Bad loans are defined as loans for which legal proceedings have been instituted to obtain repayment.

The permanent component of GDP has been computed using the Beveridge and Nelson (1981) decomposition. An ARIMA model (1,1,1) was applied to the logarithm of the series. Computations have been carried out using the algorithm described in Newbold (1990). Robustness of the results have been checked by means of a statistical analysis of the residuals.

The possible presence of structural breaks in interest rate series has been investigated using the procedure developed by Banerjee, Lumsdaine and Stock (1992). Figure A1 shows the sequential test for changes in the mean of each interest rate series. The hypothesis of this procedure is that, if there is a break, its date is not known *a priori* but rather is gleaned from the data. The results show clearly that unit-root/no-break null can be rejected at the 2.5 per cent critical value level against the stationarity/mean-shift alternative for the period 1995:03-1998:03. In all the equations a convergence dummy, that takes the value of 1 in this period and 0 elsewhere, has been introduced.

[26] The same methodology has been used, among others by Peek and Rosengreen (1995), Kishan and Opiela (2000) and Ehrmann et al. (2003).

Tables and figures

Table 1

VARIABLES DESCRIPTION

Variables	Symbols	Description
Dependent variables	i_L	Interest rate on domestic short-term loans
	i_D	Interest rate on current account deposits
Fixed effects	μ_k	Bank-specific dummy variable
Macro variables	i_M	Monetary policy indicator
	y^P, y^T	Permanent and transitory components of real GDP computed using the Beveridge and Nelson (1981) decomposition
	p	Inflation rate
Bank-specific characteristics that influence the "bank lending channel"	X_k	Size: log of total assets (Kashyap and Stein, 1995; Ehrmann et al., 2003)
		Liquidity: cash and securities over total assets (Stein, 1998; Kashyap and Stein, 2000)
		Excess capital: difference between regulatory capital and capital requirements (Peek and Rosengren, 1995; Kishan and Opiela, 2000; Gambacorta and Mistrulli, 2004)
		Deposit strength: ratio between deposits and bonds plus deposits (Berlin and Mester,1999; Weth, 2002)
		Credit relationship: ratio between long term loans and total loans (Berger and Udell, 1992)
Measure for the "bank capital channel"	c_k	Bank-specific cost of monetary policy due to maturity transformation
Risk measure	j_k	Ratio between bad loans and total loans. This variable captures the riskiness of lending operations and should be offset by a higher expected yield on loans.
Efficiency ratio	e_k	Management efficiency: ratio of total loans and deposits to the number of branches.
Interest rate volatility	σ	Interest rate volatility: coefficient of variation of i_M .
Dummies	$\overline{\Phi}$	Convergence dummy: step dummy that takes the value of 1 in the period 1995:03-1998:03 and 0 elsewhere.
		Seasonal dummies.

Note: For more information on the definition of the variables see the Appendix.

Table 2

SUMMARY STATISTICS
(1993:03-2001:03)

Former special credit institutions, foreign banks and "banche di credito cooperativo" are excluded. The sample represents more than 70 per cent of the total system in terms of lending. All interest rates are annualized and given in percentages. (1) The size indicator is given by total asset (billions of euros). (2) The liquidity indicator is represented by the sum of cash and government securities over total assets. (3) The capital ratio is given by excess capital divided by total assets. Excess capital is the difference between regulatory capital and total capital requirements. (4) The Berlin and Mester indicator (BM) is the ratio between deposits and deposits plus bonds. (5) The Berger and Udell indicator (BU) is the ratio between long-term loans and total loans. A bank with a "high" characteristic has an average ratio above the first quartile of the distribution. (*) A bank with a "low"characteristic has an average ratio below the third quartile. Since the characteristics of each bank could change with time, percentiles have been worked out on mean values. For more details regarding the definition of the variables see Appendix 2. The sources of the dataset are Bank of Italy supervisory returns and 10-day reports.

	Bank-characteristics (*)	Number of banks	Interest rate on short-term lending				Interest rate on current accounts				Size (1)	Liq. (2)	Cap. (3)	BM (4)	BU (5)
			Mean	St. dev.	Min	Max	Mean	St. dev.	Min	Max					
	Total sample	73	9.51	2.72	3.69	16.12	3.58	1.79	0.52	8.21	16.20	24.00	3.91	82.40	37.66
(1)	Big banks	18	9.28	2.81	3.69	15.06	3.57	1.74	0.73	7.35	51.15	19.01	2.56	77.60	38.98
	Small banks	18	10.02	2.73	5.03	16.12	3.55	1.79	0.52	8.21	1.55	25.11	4.81	84.40	41.72
(2)	Liquid banks	18	9.51	2.72	3.69	15.94	3.57	1.80	0.65	8.21	4.67	33.07	4.27	86.27	36.15
	Low-liquid banks	18	9.33	2.73	4.42	14.86	3.61	1.71	0.73	7.35	43.75	14.91	3.13	72.43	43.66
(3)	Well-capitalized banks	18	9.71	2.73	3.69	16.12	3.68	1.80	0.52	7.18	9.66	26.15	6.86	85.49	37.22
	Low-capitalized banks	18	9.42	2.81	4.75	15.93	3.53	1.79	0.74	8.21	24.28	20.82	1.49	78.40	38.46
(4)	Banks with high BM ratio	18	11.78	1.49	4.88	16.12	5.15	0.96	0.74	8.21	6.58	29.69	4.46	98.53	28.72
	Banks with low BM ratio	18	7.77	2.24	3.69	15.06	2.41	1.45	0.52	7.35	27.00	18.56	3.42	66.10	45.30
(5)	Banks with high BU ratio	18	8.51	2.59	3.69	15.06	2.80	1.67	0.65	7.36	21.92	19.98	3.80	71.84	53.29
	Banks with low BU ratio	18	10.97	2.12	4.00	16.12	4.68	1.44	0.53	7.43	8.51	28.26	3.95	93.13	22.46

Table 3

RESULTS FOR THE EQUATION ON THE INTEREST RATE ON SHORT-TERM LENDING

This table shows the results of the equation for the interest rate on short-term lending. The model is given by the following equation, which includes interaction terms that are the product of the monetary policy indicator and a bank-specific characteristic:

$$\Delta i_{Lk,t} = \mu_k + \sum_{j=1}^{2} \kappa_j \Delta i_{Lk,t-j} + \sum_{j=0}^{1} (\beta_j + \beta_j^* X_{k,t-1}) \Delta i_{Mt-j} + \lambda X_{k,t-1} + (\alpha + \alpha^* X_{k,t-1}) i_{Lk,t-1} + (\gamma + \gamma^* X_{k,t-1}) i_{Mt-1} +$$

$$+ \delta_1 \Delta \ln y_t^P + \delta_2 \Delta \ln y_t^T + \varphi p_t + \eta \Delta c_{k,t} + \theta j_{k,t} + \xi e_{k,t} + \psi \sigma_t + \Gamma \overline{\Phi}_{k,t} + \varepsilon_{k,t}$$

with k=1,…, N (k=number of banks) and t=1, …,T (t= periods). Data are quarterly (1993:03-2001:03) and not seasonally adjusted. The panel is balanced with N=73 banks. Lags have been selected in order to obtain white noise residuals. The description of the variables is reported in Table 1. The models have been estimated using the GMM estimator suggested by Arellano and Bond (1991), which ensures efficiency and consistency provided that the models are not subject to serial correlation of order two and that the instruments used are valid (which is tested for with the Sargan test). A bank with "low characteristic" has an average ratio below the first quartile, a bank with "high characterisic" has an average ratio above the third quartile. For more details regarding the data see the Appendix. *=significance at the 10 per cent level; **=significance at the 5 per cent level; ***=significance at the 1 per cent level.

Dependent variable: quarterly change of the interest rate on short-term lending	(1) Size		(2) Liquidity		(3) Capitalization		(4) Dep./(Bonds+Dep.)		(5) Long term loans/ Total loans	
	Coeff.	S.Error	Coeff.	S.Error	Coeff.	S.Error	Coeff.	S.Error	Coeff.	S.Error
Loan demand										
Inflation:	0.159 ***	0.019	0.145 ***	0.017	0.145 ***	0.015	0.149 ***	0.018	0.187 ***	0.015
Permanent Income:	0.033 **	0.015	0.030 ***	0.012	0.032 **	0.013	0.025 **	0.012	0.043 ***	0.010
Transitory Income:	0.012	0.031	0.013	0.025	0.012	0.026	0.012	0.024	0.026	0.020
Costs, credit risk and int.rate volatility										
Bank efficiency:	-0.004 **	0.002	-0.001	0.002	-0.006 **	0.002	-0.001	0.001	-0.001	0.001
Bad loans:	0.020 ***	0.002	0.016 ***	0.002	0.017 ***	0.001	0.020 ***	0.002	0.019 ***	0.002
Interest rate volatility:	0.011 ***	0.001	0.012 ***	0.001	0.010 ***	0.001	0.014 ***	0.001	0.012 ***	0.001
Immediate pass-through										
Average bank:	0.569 ***	0.027	0.403 ***	0.031	0.533 ***	0.023	0.465 ***	0.030	0.497 ***	0.034
Ho: no heterogeneity (p-value)		0.003		0.018		0.418		0.023		0.000
Low characteristic	0.556 ***	0.028	0.414 ***	0.027	0.536 ***	0.022	0.474 ***	0.028	0.529 ***	0.033
High characteristic	0.586 ***	0.026	0.383 ***	0.036	0.529 ***	0.026	0.456 ***	0.032	0.463 ***	0.035
Pass-through after a quarter										
Average bank:	0.938 ***	0.013	0.941 ***	0.018	0.954 ***	0.012	0.869 ***	0.016	0.878 ***	0.013
Ho: no heterogeneity (p-value)		0.000		0.000		0.037		0.159		0.000
Low characteristic	0.913 ***	0.015	0.962 ***	0.018	0.958 ***	0.011	0.862 ***	0.017	0.889 ***	0.014
High characteristic	0.971 ***	0.014	0.920 ***	0.018	0.949 ***	0.015	0.878 ***	0.016	0.863 ***	0.012
Long run elasticity										
Average bank:	1.017 ***	0.014	0.996 ***	0.014	1.023 ***	0.012	0.982 ***	0.015	1.012 ***	0.018
Ho: unitary long run elasticity (p-val.)		0.056		0.816		0.047		0.235		0.489
Ho: no heterogeneity (p-value)		0.509		0.822		0.883		0.924		0.644
Low characteristic	0.996 ***	0.014	0.987 ***	0.015	1.031 ***	0.013	0.990 ***	0.026	0.992 ***	0.016
High characteristic	1.049 ***	0.016	1.005 ***	0.015	1.015 ***	0.012	0.978 ***	0.012	1.040 ***	0.023
Loading of the long-run relationship										
Average bank:	-0.477 ***	0.023	-0.422 ***	0.019	-0.507 ***	0.023	-0.381 ***	0.043	-0.382 ***	0.017
Ho: no heterogeneity (p-value)		0.000		0.000		0.035		0.000		0.000
Low characteristic	-0.505 ***	0.026	-0.391 ***	0.023	-0.482 ***	0.028	-0.234 ***	0.021	-0.434 ***	0.017
High characteristic	-0.441 ***	0.023	-0.451 ***	0.019	-0.539 ***	0.026	-0.519 ***	0.020	-0.330 ***	0.020
Bank capital channel	0.104 *	0.055	0.409 ***	0.070	0.178 ***	0.051	0.197 ***	0.066	0.109 *	0.066
Miss-specification tests										
MA(1), MA(2) (p-value)	0.000	0.949	0.000	0.367	0.000	0.702	0.000	0.185	0.000	0.116
Sargan test (p-value)		0.087		0.099		0.088		0.101		0.057
No of banks, no of observations	73	2336	73	2336	73	2336	73	2336	73	2336

Table 4

RESULTS FOR THE EQUATION ON INTEREST RATE ON CURRENT ACCOUNTS

This table shows the results of the equation for the interest rate on current accounts. The model is given by the following equation, which includes interaction terms that are the product of the monetary policy indicator and a bank-specific characteristic:

$$\Delta i_{Dk,t} = \mu_k + \sum_{j=1}^{2} \kappa_j \Delta i_{Dk,t-j} + \sum_{j=0}^{1} (\beta_j + \beta_j^* X_{k,t-1}) \Delta i_{Mt-j} + \lambda X_{k,t-1} + (\alpha + \alpha^* X_{k,t-1}) i_{Dk,t-1} + (\gamma + \gamma^* X_{k,t-1}) i_{Mt-1} +$$

$$+ \delta_1 \Delta \ln y_t^P + \delta_2 \Delta \ln y_t^T + \varphi\, p_t + \eta \Delta c_{k,t} + \xi\, e_{k,t} + \psi \sigma_t + \Gamma \overline{\Phi}_{k,t} + \varepsilon_{k,t}$$

with k=1,…, N (k=number of banks) and t=1, …,T (t= periods). Data are quarterly (1993:03-2001:03) and not seasonally adjusted. The panel is balanced with N=73 banks. Lags have been selected in order to obtain white noise residuals. The description of the variables is reported in Table 1. The models have been estimated using the GMM estimator suggested by Arellano and Bond (1991), which ensures efficiency and consistency provided that the models are not subject to serial correlation of order two and that the instruments used are valid (which is tested for with the Sargan test). A bank with "low characteristic" has an average ratio below the first quartile, a bank with "high characterisic" has an average ratio above the third quartile. For more details regarding the data see the Appendix. *=significance at the 10 per cent level; **=significance at the 5 per cent level; ***=significance at the 1 per cent level.

Dependent variable: quarterly change of the interest rate on current accounts	(1) Size		(2) Liquidity		(3) Capitalization		(4) Dep./(Bonds+Dep.)		(5) Long term loans/ Total loans	
	Coeff.	S.Error	Coeff.	S.Error	Coeff.	S.Error	Coeff.	S.Error	Coeff.	S.Error
Deposit demand										
Inflation:	0.049 ***	0.015	0.091 ***	0.012	0.058 ***	0.015	0.099 ***	0.008	0.039 ***	0.009
Permanent Income:	-0.058 ***	0.006	-0.048 ***	0.006	-0.058 ***	0.005	-0.024 *	0.013	-0.052 ***	0.004
Transitory Income:	-0.222 ***	0.012	-0.204 ***	0.012	-0.223 ***	0.011	-0.102 ***	0.012	-0.202 ***	0.010
Costs, credit risk and int.rate volatility										
Bank efficiency:	0.001	0.001	0.001	0.001	0.001	0.002	0.012 ***	0.001	0.002 *	0.001
Interest rate volatility:	0.001 **	0.001	0.002 ***	0.001	0.001 ***	0.001	0.005 ***	0.000	0.002 ***	0.001
Immediate pass-through										
Average bank:	0.413 ***	0.013	0.411 ***	0.010	0.410 ***	0.008	0.418 ***	0.009	0.388 ***	0.008
Ho: no heterogeneity (p-value)		0.000		0.000		0.742		0.000		0.000
Low characteristic	0.400 ***	0.015	0.431 ***	0.010	0.411 ***	0.009	0.451 ***	0.009	0.408 ***	0.007
High characteristic	0.429 ***	0.012	0.394 ***	0.010	0.409 ***	0.009	0.387 ***	0.010	0.366 ***	0.010
Pass-through after a quarter										
Average bank:	0.546 ***	0.009	0.541 ***	0.008	0.544 ***	0.007	0.507 ***	0.006	0.540 ***	0.006
Ho: no heterogeneity (p-value)		0.000		0.000		0.049		0.000		0.776
Low characteristic	0.512 ***	0.010	0.551 ***	0.008	0.551 ***	0.007	0.526 ***	0.006	0.536 ***	0.006
High characteristic	0.588 ***	0.008	0.530 ***	0.008	0.535 ***	0.009	0.493 ***	0.008	0.542 ***	0.008
Long-run elasticity										
Average bank:	0.685 ***	0.013	0.685 ***	0.009	0.676 ***	0.009	0.643 ***	0.007	0.669 ***	0.010
Ho: unitary long run elasticity (p-val.)		0.000		0.000		0.000		0.000		0.000
Ho: no heterogeneity (p-value)		0.905		0.205		0.463		0.444		0.717
Low characteristic	0.688 ***	0.014	0.670 ***	0.010	0.663 ***	0.009	0.631 ***	0.006	0.675 ***	0.010
High characteristic	0.682 ***	0.013	0.699 ***	0.009	0.694 ***	0.011	0.654 ***	0.009	0.661 ***	0.011
Loading of the long-run relationship										
Average bank:	-0.572 ***	0.018	-0.646 ***	0.018	-0.609 ***	0.020	-0.760 ***	0.016	-0.572 ***	0.016
Ho: no heterogeneity (p-value)		0.000		0.016		0.000		0.000		0.000
Low characteristic	-0.537 ***	0.018	-0.657 ***	0.020	-0.645 ***	0.019	-0.725 ***	0.019	-0.610 ***	0.017
High characteristic	-0.610 ***	0.023	-0.634 ***	0.017	-0.564 ***	0.025	-0.795 ***	0.017	-0.533 ***	0.017
Bank capital channel	-0.055 ***	0.015	-0.036 ***	0.012	-0.049 ***	0.009	-0.039 ***	0.013	-0.034 ***	0.009
Miss-specification tests										
MA(1), MA(2) (p-value)	0.000	0.953	0.000	0.976	0.000	0.785	0.000	0.340	0.000	0.508
Sargan test (p-value)		0.091		0.960		0.094		0.092		0.095
No of banks, no of observations	73	2336	73	2336	73	2336	73	2336	73	2336

Table 5

BANK LENDING CHANNEL

This table shows the results of the equation for the interest rate on short-term lending (panel A) and current accounts (panel B) when all bank-specific characteristics are taken simultaneously into account. The model is given by the following equation, which includes interaction terms that are the product of the monetary policy indicator and each bank-specific characteristic:

$$\Delta i_{W\,k,t} = \mu_k + \sum_{j=1}^{2} \kappa_j \Delta i_{W\,k,t-j} + \sum_{m=1}^{5}\sum_{j=0}^{1} (\beta_j + \beta_j^* X_{k,m,t-1})\Delta i_{M\,t-j} + \sum_{m=1}^{5} \lambda_m X_{k,m,t-1} + (\alpha + \sum_{m=1}^{5} \alpha^* X_{k,m,t-1})(i_{\psi\,k,t-1} - \gamma\, i_{M\,t-1}) +$$
$$+ \delta_1 \Delta \ln y_t^P + \delta_2 \Delta \ln y_t^T + \varphi\, p_t + \eta \Delta c_{k,t} + \xi\, e_{k,t} + \psi \sigma_t + \Gamma \overline{\Phi}_{k,t} + \varepsilon_{k,t}$$

with iw= quarterly change of the interest rate on short-term lending or current accounts k=1,…, N (k=number of banks) and t=1, …,T (t= periods). Bank-specific characteristics are size,liquidity, capitalization, Berlin-Mester and Berger-Udell indicators (m=5). Data are quarterly (1992:03-2001:03) and not seasonally adjusted. The panel is balanced with N=73 banks. Lags have been selected in order to obtain white noise residuals. The description of the variables is reported in Table 1. The models have been estimated using the GMM estimator suggested by Arellano and Bond (1991) which ensures efficiency and consistency provided that the models are not subject to serial correlation of order two and that the instruments used are valid (which is tested for with the Sargan test). A bank with "low characteristic" has an average ratio below the first quartile, a bank with "high characterisic" has an average ratio above third quartile. For more details regading the data see the Appendix. *=significance at the 10 per cent level; **=significance at the 5 per cent level; ***=significance at the 1 per cent level.

	(1) Size		(2) Liquidity		(3) Capitalization		(4) Dep./(Bonds+Dep.)		(5) Long term loans/ Total loans	
	Coeff.	S.Error	Coeff.	S.Error	Coeff.	S.Error	Coeff.	S.Error	Coeff.	S.Error
(A) Dependent variable is the quarterly change of the interest rate on short-term lending										
Immediate pass-through										
Average bank:	0.452 ***	0.062	0.452 ***	0.062	0.452 ***	0.062	0.452 ***	0.062	0.452 ***	0.062
Ho: no heterogeneity (p-value)		0.159		0.027		0.043		0.702		0.016
Low characteristic	0.492 ***	0.064	0.476 ***	0.058	0.558 ***	0.065	0.460 ***	0.059	0.519 ***	0.050
High characteristic	0.393 ***	0.080	0.421 ***	0.069	0.308 ***	0.110	0.437 ***	0.077	0.375 ***	0.084
Pass-through after a quarter										
Average bank:	0.879 ***	0.039	0.879 ***	0.039	0.879 ***	0.039	0.879 ***	0.039	0.879 ***	0.039
Ho: no heterogeneity (p-value)		0.639		0.317		0.744		0.913		0.912
Low characteristic	0.895 ***	0.058	0.891 ***	0.036	0.914 ***	0.082	0.883 ***	0.050	0.888 ***	0.039
High characteristic	0.857 ***	0.040	0.868 ***	0.033	0.847 ***	0.075	0.876 ***	0.047	0.873 ***	0.053
Long-run elasticity										
All banks:	1.000 -	-	1.000 -	-	1.000 -	-	1.000 -	-	1.000 -	-
Loading of the long-run relationship										
Average bank:	-0.354 ***	0.050	-0.354 ***	0.050	-0.354 ***	0.050	-0.354 ***	0.050	-0.354 ***	0.050
Ho: no heterogeneity (p-value)		0.681		0.990		0.536		0.761		0.773
Low characteristic	-0.377 ***	0.072	-0.354 ***	0.063	-0.318 ***	0.070	-0.332 ***	0.089	-0.332 ***	0.086
High characteristic	-0.324 ***	0.092	-0.354 ***	0.046	-0.399 ***	0.095	-0.375 ***	0.085	-0.376 ***	0.095
Miss-specification tests										
MA(1), MA(2) (p-value)	0.000	0.073								
Sargan test (p-value)		0.985								
No of banks, no of observations	73	2336								
(B) Dependent variable is the quarterly change of the interest rate on current accounts										
Immediate pass-through										
Average bank:	0.452 ***	0.042	0.452 ***	0.042	0.452 ***	0.042	0.452 ***	0.042	0.452 ***	0.042
Ho: no heterogeneity (p-value)		0.972		0.129		0.529		0.032		0.112
Low characteristic	0.453 ***	0.043	0.470 ***	0.050	0.479 ***	0.054	0.509 ***	0.044	0.497 ***	0.062
High characteristic	0.452 ***	0.050	0.434 ***	0.037	0.419 ***	0.074	0.400 ***	0.054	0.406 ***	0.062
Pass-through after a quarter										
Average bank:	0.545 ***	0.033	0.545 ***	0.033	0.545 ***	0.033	0.545 ***	0.033	0.545 ***	0.033
Ho: no heterogeneity (p-value)		0.160		0.978		0.481		0.203		0.224
Low characteristic	0.572 ***	0.032	0.546 ***	0.038	0.566 ***	0.055	0.590 ***	0.045	0.563 ***	0.041
High characteristic	0.524 ***	0.043	0.545 ***	0.033	0.517 ***	0.045	0.516 ***	0.039	0.525 ***	0.034
Long-run elasticity										
Average bank:	0.700 -	-	0.700 -	-	0.700 -	-	0.700 -	-	0.700 -	-
Loading of the long-run relationship										
Average bank:	-0.570 ***	0.043	-0.570 ***	0.043	-0.570 ***	0.043	-0.570 ***	0.043	-0.570 ***	0.043
Ho: no heterogeneity (p-value)		0.388		0.820		0.481		0.004		0.575
Low characteristic	-0.537 ***	0.048	-0.565 ***	0.050	-0.607 ***	0.019	-0.452 ***	0.062	-0.589 ***	0.059
High characteristic	-0.612 ***	0.074	-0.575 ***	0.047	-0.523 ***	0.025	-0.680 ***	0.054	-0.550 ***	0.051
Miss-specification tests										
MA(1), MA(2) (p-value)	0.000	0.915								
Sargan test (p-value)		0.180								
No of banks, no of observations	73	2336								

Fig. 1

Banking interest rates
(quarterly data, percentage points)

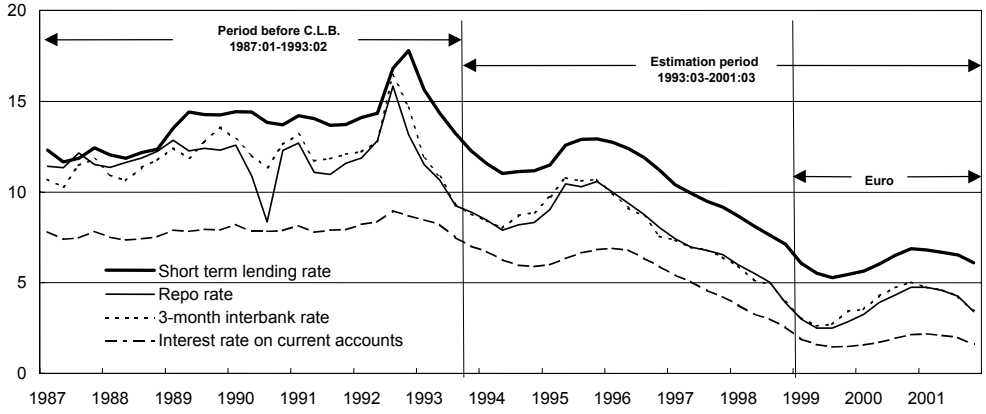


Fig. 2

Cross-sectional and time series dispersion of interest rates

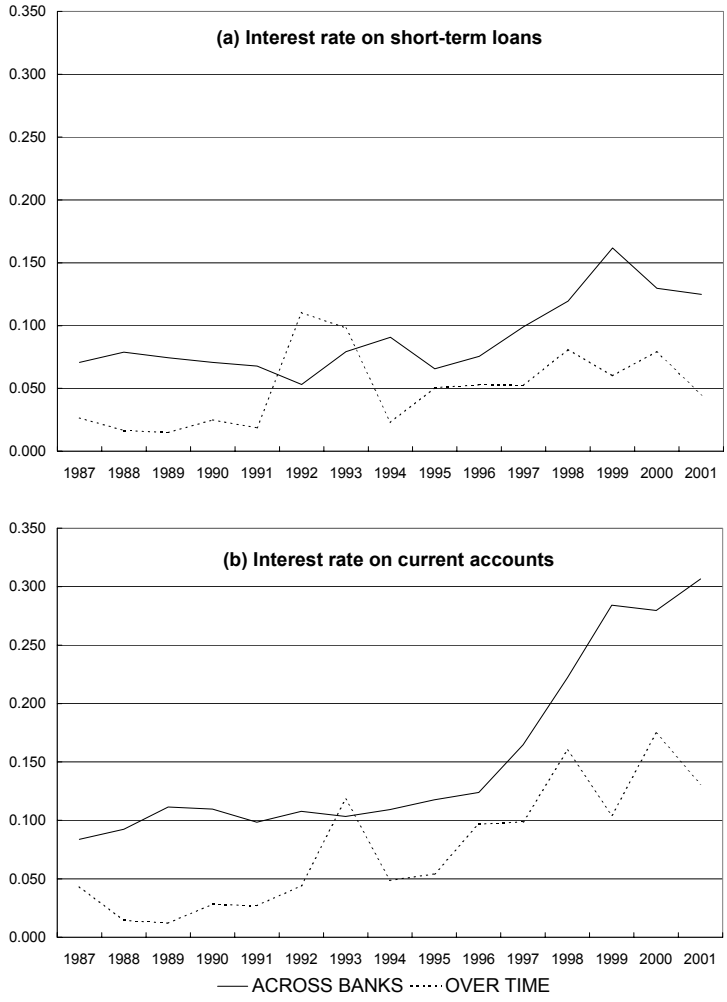
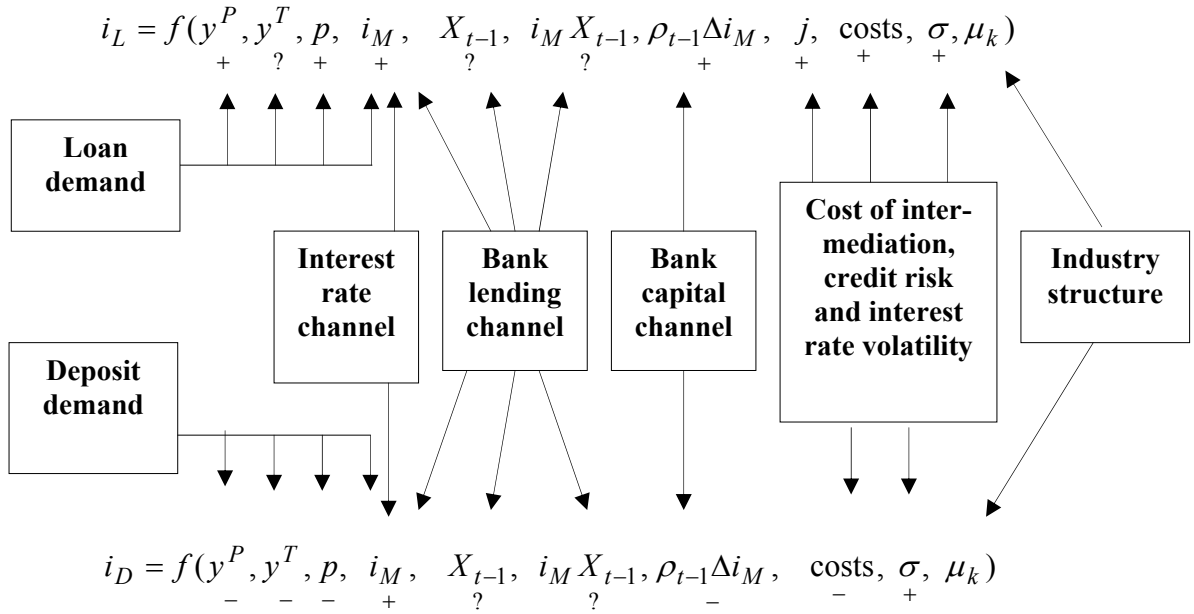


Fig. 3

Determinants of bank interest rates

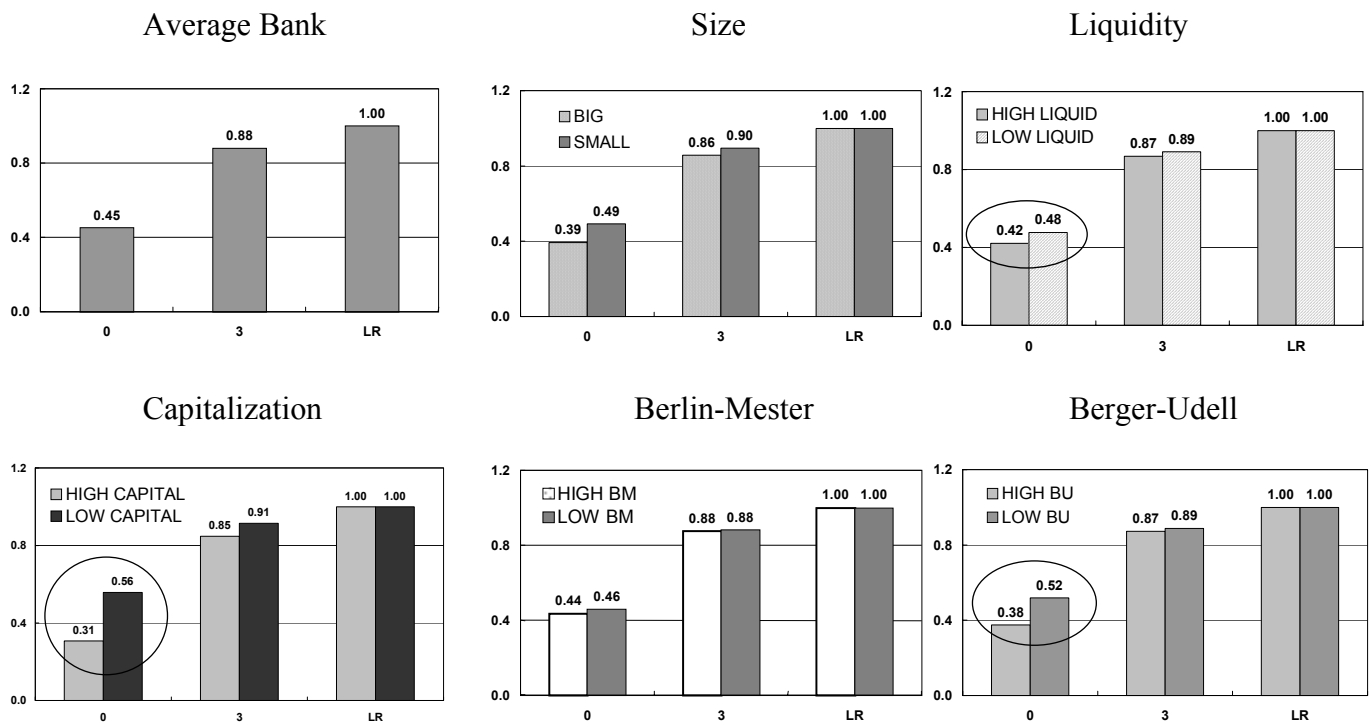


Note: the meaning of all the symbols is reported in Table 1.

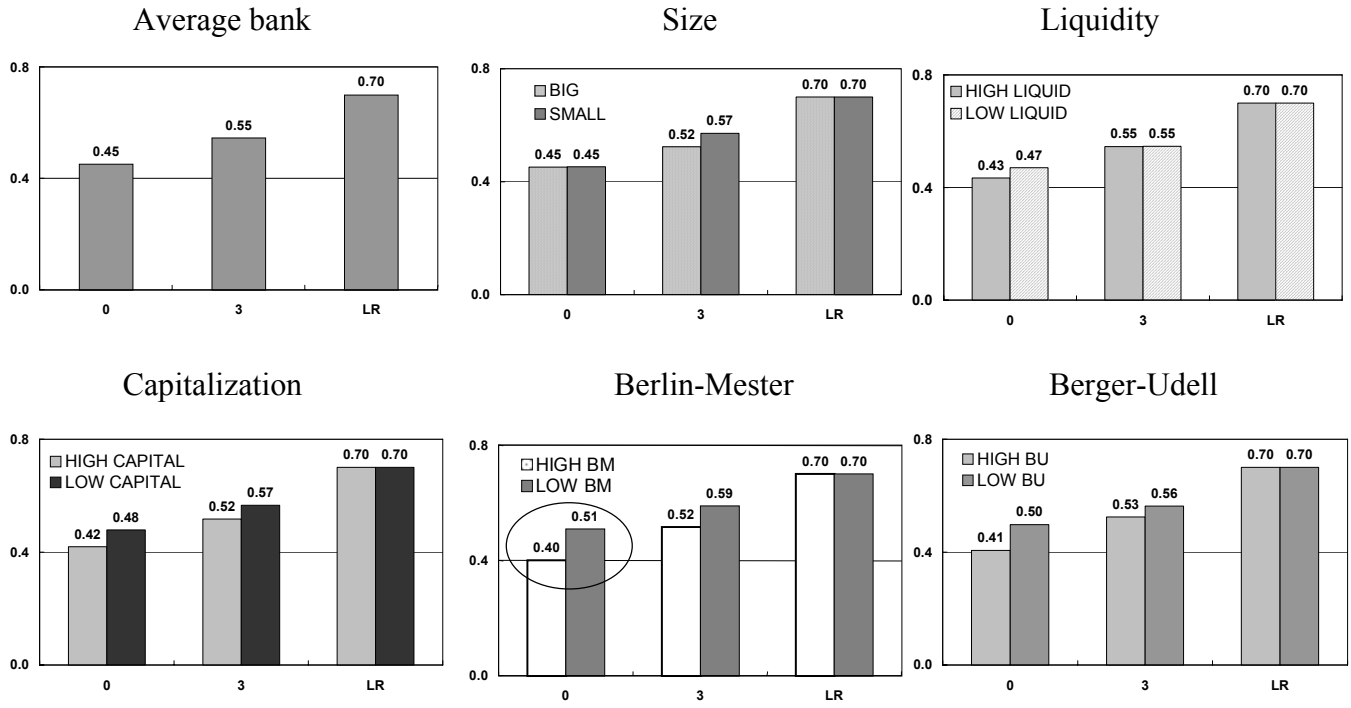
Fig. 4

Bank lending channel effects

A) Effects on the interest rate on short-term lending of a 1 per cent increase in the money market rate



B) Effects on the interest rate on current accounts of a 1 per cent increase in the money market rate

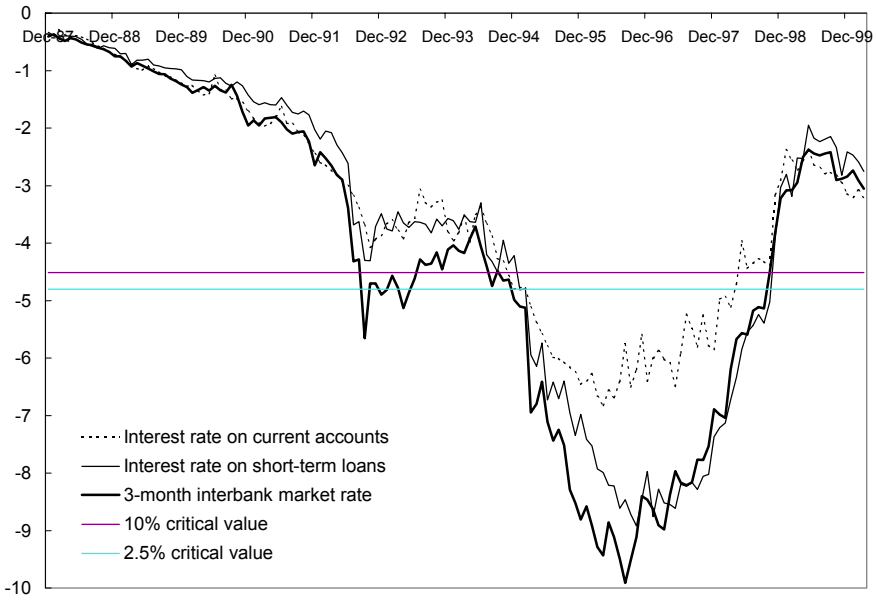


Note: The presence of significant distributional effects is highlighted. P-values are provided in Table 5.

Fig. A1

Search for mean shift breaks

(monthly data, sequential minimum unit root tests)



Note: The estimated model tests for a shift in the constant. No trend is included. Sequential statistics are computed using the sample 1984:7-2002:12, sequentially incrementing the date of the hypothetical shift. A fraction equal to 15 per cent of the total sample at the beginning and at the end of the sample is not considered for the test. For more details see Banerjee, Lumsdaine and Stock (1992).

References

Altunbas Y., Fazylow O. and Molyneux P. (2002), "Evidence on the Bank Lending Channel in Europe", *Journal of Banking and Finance*, Vol. 26, No. 11, pp. 2093-2110.

Angbazo L. (1997), "Commercial Bank Net Interest Margins, Default Risk, Interest-rate risk, and Off-balance Sheet Banking", *Journal of Banking and Finance*, Vol. 21, No. 1, pp. 55-87.

Angelini P. and Cetorelli N. (2002), "The Effects of Regulatory Reform on Competition in the Banking Industry", *Journal of Money, Credit and Banking*, Vol. 35, No. 5, pp. 663-684.

Angelini P., Di Salvo P. and Ferri G. (1998), "Availability and Cost of Credit for Small Businesses: Customer Relationships and Credit Cooperatives", *Journal of Banking and Finance*, Vol. 22, No. 6-8, pp. 925-954.

Angeloni I., Buttiglione L., Ferri G. and Gaiotti E. (1995), "The Credit Channel of Monetary Policy across Heterogeneous Banks: The Case of Italy", Banca d'Italia, Temi di discussione, No. 256.

Ausubel L. M. (1992), Rigidity and Asymmetric Adjustment of Bank Interest Rates, mimeo.

Banca d'Italia (1986), "Modello trimestrale dell'economia italiana", Banca d'Italia, Temi di discussione, No. 80.

Banca d'Italia (1988), "Modello mensile del mercato monetario", Banca d'Italia, Temi di discussione, No. 108.

Banerjee A., Lumsdaine R.L. and Stock J.H. (1992), "Recursive and Sequential Tests of the Unit-Root and Trend Break Hypotheses: Theory and International Evidence", *Journal of Business and Economic Statistics*, Vol. 10, No. 3, pp. 271-287.

Berger A.N. and Udell G.F. (1992), "Some Evidence on the Empirical Significance of Credit Rationing", *Journal of Political Economy*, Vol. 100, No. 5, pp. 1047-1077.

Berlin M. and Mester L.J. (1999), "Deposits and Relationship Lending", *Review of Financial Studies*, Vol. 12, No. 3, pp. 579-607.

Bernanke B. and Blinder A.S. (1988), "Is it Money or Credit, or Both or Neither? Credit, Money and Aggregate Demand", *American Economic Review*, Vol. 78, No. 2, pp. 435-439. Paper and Proceedings of the One-Hundredth Annual Meeting of the American Economic Association.

Beveridge S. and Nelson C. (1981), "A New Approach to the Decomposition of Economics Time Series into Permanent and Transitory Components with Particular Attention to Measurement of the Business Cycle", *Journal of Monetary Economics*, Vol. 21, No. 2, pp. 151-174.

Boccuzzi G. (1998), *La crisi dell'impresa bancaria. Profili economici e giurid*ici, Giuffrè, Milano.

Bolton P. and Freixas X. (2001), "Corporate Finance and the Monetary Transmission Mechanism", CEPR, Discussion Paper Series, No. 2982.

Calomiris C.W. and Hubbard G.R. (1995), "Internal Finance and Investment: Evidence from the Undistributed Profit Tax of 1936-37", *Journal of Business*, Vol. 68, No. 4, pp. 443-482.

Ciocca P. (2000), *La nuova finanza in Italia. Una difficile metamorfosi (1980-2000)*, Bollati Boringhieri, Torino.

Cornett M. and Tehranian H. (1994), "An Examination of Voluntary Versus Involuntary Security Issuances by Commercial Banks: The Impact of Capital Regulations on Common Stock Returns", *Journal of Financial Economics*, Vol. 35, No. 1, pp. 99-122.

Cottarelli C. and Kourelis A. (1994), "Financial Structure, Bank Lending Rates and the Transmission Mechanism of Monetary Policy", IMF Staff Papers, Vol. 41, No. 4, pp.587-623.

Cottarelli C., Ferri G. and Generale A. (1995), "Bank Lending Rates and Financial Structure in Italy: A Case Study", IMF Working Papers, No. 38.

de Bondt G., Mojon B. and Valla N. (2003), "Term Structure and the Sluggishness of Retail Bank Rates in the Euro Area", ECB, mimeo.

Dermine J. (1991), Discussion to Vives X., "Banking Competition and European Integration", in Giovannini A. and Mayer C. (eds.), *European Financial Integration*, Cambridge, Cambridge University Press.

Dewatripont M. and Tirole J. (1994), *The Prudential Regulation of Banks*, Cambridge, Massachusetts, MIT Press.

Ehrmann M., Gambacorta L., Martinez Pagés J., Sevestre P. and Worms A. (2003), "Financial Systems and the Role of Banks in Monetary Policy Transmission in the Euro Area", in Angeloni I., Kashyap A. and Mojon B. (eds.), *Monetary Policy Transmission in the Euro Area*, Cambridge, Cambridge University Press.

Focarelli D. and Panetta F. (2003), "Are Merger Beneficial to Consumers? Evidence from the Market for Bank Deposits", *American Economic Review*, Vol. 93, No. 4, pp. 1152-1172.

Friedman B. and Kuttner K. (1993), "Economic Activity and the Short-Term Credit Markets: an Analysis of Prices and Quantities", *Brooking Papers on Economic Activity*, Vol. 2, pp. 193-283.

Freixas X. and Rochet J. (1997), *Microeconomics of Banking*, Cambridge, MIT Press.

Gaiotti E. (1992), "L'evoluzione delle tecniche di controllo monetario nel modello mensile della Banca d'Italia", mimeo, Banca d'Italia.

Gambacorta L. (2004), "Inside the Bank Lending Channel", *European Economic Review*, forthcoming.

Gambacorta L. and Mistrulli P. (2004), "Does Bank Capital Affect Lending Behavior?", *Journal of Financial Intermediation*, Vol. 13, No. 4, pp. 436-457.

Green C.J. (1998), "Banks as Interest Rate Managers", *Journal of Financial Services Research*, Vol. 14, No. 3, pp. 189-208.

Hancock D. (1991), *A Theory of Production for the Financial Firm,* Norwell, Massachusetts, Kluwer Academic Publishers.

Hannan T.H. and Berger A.N. (1991), "The Rigidity of Prices: Evidence From Banking Industry", *American Economic Review*, Vol. 81, No. 4, pp. 938-945.

Harvey (1981), *Time Series Models*, Oxford, Allan.

Ho T.S.Y. and Saunders A. (1981), The Determinants of Bank Interest Margins: Theory and Empirical Evidence", *Journal of Financial and Quantitative Analysis*, Vol. 16, No. 2, pp. 581-600.

Houston J.F. and James C. (1998), "Do Bank Internal Capital Market Promote Lending?", *Journal of Banking and Finance*, Vol. 22, No. 6-8, pp. 899-918.

Hutchison D.E. (1995), "Retail Bank Deposit Pricing: An Intertemporal Asset Pricing Approach", *Journal of Money Credit and Banking*, Vol. 27, No. 1, pp. 217-231.

Kashyap A. and Stein J.C. (1995), "The Impact of Monetary Policy on Bank Balance Sheets", *Carnegie Rochester Conference Series on Public Policy*, Vol. 42, pp.151-195.

Kashyap A. and Stein J.C. (2000), "What Do a Million Observations on Banks Say About the Transmission of Monetary Policy", *American Economic Review*, Vol. 90, No. 3, pp. 407-428.

Kashyap A., Stein J.C. and Wilcox D. (1993), "Monetary Policy and Credit Conditions: Evidence from the Composition of External Finance", *American Economic Review*, Vol. 83, No. 1, pp. 78-98.

Kishan R.P. and Opiela T.P. (2000), "Bank Size, Bank Capital and the Bank Lending Channel", *Journal of Money, Credit and Banking*, Vol. 32, No. 1, pp. 121-141.

Klein M. (1971), "A Theory of the Banking Firm", *Journal of Money, Credit and Banking*, Vol. 3, No. 2, pp. 205-218.

Lim G.C. (2000), "Bank Interest Rate Adjustments: Are They Asymmetric?", *The Economic Record*, Vol. 77, No. 237, pp. 135-147.

Melitz J. and Pardue M. (1973), "The Demand and Supply of Commercial Bank Loans", *Journal of Money, Credit and Banking*, Vol. 5, No. 2, pp. 669-692.

Moore G.R., Porter R.D. and Small D.H. (1990), "Modelling the Disaggregated Demands for M2 and M1: the U.S. Experience in the 1980s", Proceedings of a Federal Reserve Board Conference on Monetary Aggregates and Financial System Behavior.

Myers S.C. and Majluf N.S. (1984), "Corporate Finance and Investment Decisions when Firms Have Information that Investors Do Not Have", *Journal of Financial Economics*, Vol. 13, No. 2, pp. 187-221.

Neumark D. and Sharpe S.A. (1992), "Market Structure and the Nature of Price Rigidity: Evidence From the Market for Consumer Deposits", *Quarterly Journal of Economics*, Vol. 107, No. 2, pp. 657-680.

Newbold P. (1990), "Precise and Efficient Computation of the Beveridge-Nelson Decomposition of Economic Time Series", *Journal of Monetary Economics*, Vol. 26, No. 3, pp. 453-457.

Pagan A.R. (1990), "Three Econometric Methodologies: a Critical Appraisal", in Granger C.W.J. (eds.), *Modelling Economic Series: Readings in Econometric*, Oxford, Oxford University Press, pp. 97-120.

Passacantando F. (1996), "Building an Institutional Framework for Monetary Stability", *BNL Quarterly Review*, Vol. 49, No. 196, pp. 83-132.

Peek J. and Rosengren E.S. (1995), "Bank Lending and the Transmission of Monetary Policy"; in Peek J. and E.S. Rosengren (eds.), *Is Bank Lending Important for the Transmission of Monetary Policy?*, Federal Reserve Bank of Boston Conference Series No. 39, pp. 47-68.

Petersen M. and Rajan R. (1994), "The Benefits of Lending Relationships: Evidence from Small Business Data", *The Journal of Finance*, Vol. 49, No. 1, pp.3-37.

Rosen R.J. (2001), What Goes Up Must Come Down? Asymmetries and Persistence in Bank Deposit Rates, Indiana University, mimeo.

Santomero A.M. (1984), "Modeling the Banking Firm: A Survey", *Journal of Money Credit and Banking*, Vo. 16, No. 4, pp. 576-602.

Stein J.C. (1998), "An Adverse-Selection Model of Bank Asset and Liability Management with Implications for the Transmission of Monetary Policy", *RAND Journal of Economics*, Vol. 29, No. 3, pp. 466-486.

Thakor A.V. (1996), "Capital Requirements, Monetary Policy, and Aggregate Bank Lending: Theory and Empirical Evidence", *The Journal of Finance*, Vol. 51, No. 1, pp. 279-324.

Upper C. and Worms A. (2004), "Estimating Bilateral Exposures in the German Interbank Market: Is There a Danger of Contagion?", *European Economic Review*, Vol. 48, No. 4, pp. 827-849.

Van den Heuvel S.J. (2001a), "The Bank Capital Channel of Monetary Policy", University of Pennsylvania, mimeo.

Van den Heuvel S.J. (2001b), "Banking Conditions and the Effects of Monetary Policy: Evidence from U.S. States", University of Pennsylvania, mimeo.

Van den Heuvel S.J. (2003), "Does Bank Capital Matter for Monetary Transmission?", *Federal Reserve Bank of New York Economic Policy Review*, May, pp. 258-265.

Verga G. (1984), "La determinazione dei tassi bancari in Italia: un'analisi per gli anni più recenti", *Banca, Impresa, Società*, Vol. 3, No. 1, pp.65-84.

Weth M.A. (2002), "The Pass-Through from Market Interest Rates to Bank Lending Rates in Germany", Discussion Paper No. 11, Economic Research Center of the Deutsche Bundesbank.

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1999

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2000

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2001

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2002

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L. CANNARI and G. D'ALESSIO, *La distribuzione del reddito e della ricchezza nelle regioni italiane*, Rivista Economica del Mezzogiorno (Trimestrale della SVIMEZ), Vol. XVI (4), pp. 809-847, Il Mulino, **TD No. 482 (June 2003)**.

2003

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L. GAMBACORTA, *The Italian banking system and monetary policy transmission: evidence from bank level data*, in: I. Angeloni, A. Kashyap and B. Mojon (eds.), Monetary Policy Transmission in the Euro Area, Cambridge, Cambridge University Press, **TD No. 430 (December 2001).**

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2004

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D. AMEL, C. BARNES, F. PANETTA and C. SALLEO, *Consolidation and Efficiency in the Financial Sector: A Review of the International Evidence*, Journal of Banking and Finance, Vol. 28 (10), pp. 2493-2519, **TD No. 464 (December 2002)**.

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2005

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